

*USE OF A MULTICOMPONENT
TREATMENT FOR FOOD REFUSAL*

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We examined the use of a multicomponent treatment for food refusal exhibited by a 5-year-old boy who had been diagnosed with mild to moderate mental retardation. Treatment consisted of access to highly preferred tangible items, which were removed contingent on problem behavior or not accepting a bite, and differential reinforcement of alternative behavior. Treatment resulted in an increase in food acceptance to 100% of bite offers and near-zero rates of problem behavior. In addition, the participant's caregivers were successfully trained to implement the treatment.

DESCRIPTORS: pediatric feeding disorder, food refusal, response cost, differential reinforcement of alternative behavior

Behavioral interventions have been effective in increasing food acceptance and decreasing problem behavior among individuals with pediatric feeding disorders. These interventions typically include differential reinforcement of alternative behavior (DRA) and extinction or manual guidance to prevent escape (Kerwin, 1999).

One intervention not typically used for food refusal is response cost (i.e., contingent loss of positive reinforcers). Keeney, Fisher, Adelinis, and Wilder (2000) examined the extent to which response cost competed with escape-maintained problem behavior (i.e., self-injury, aggression, and property destruction). The experimenters removed a preferred item (music) and provided a brief break from demands contingent on problem behavior. Response cost resulted in a significant reduction in problem behavior even though the behavior continued to be negatively reinforced. The purpose of this study was to evaluate a multicomponent intervention that included response cost (as used by

Keeney et al., 2000) as one component in the treatment of food refusal.

METHOD

Anders was a 5-year-old boy who had been diagnosed with mild to moderate mental retardation and who met the criteria for failure to thrive. He was admitted to an inpatient unit for the assessment and treatment of problem behavior (i.e., aggression and property destruction) as well as food refusal. At the time of admission, he was dependent on a gastronomy feeding tube (G-tube) for 100% of his daily caloric intake. All meal sessions were conducted in a room (3 m by 3 m) equipped with a high chair, kitchen scale, chair, and table. Data were collected on *acceptance* (eating the bite of food), *expelling* (spitting the food out of his mouth after acceptance), *gagging* (retching motion with or without a sound), *vomiting* (expulsion of food after it was swallowed), and *problem behavior* (batting the spoon away and aggression consisting of kicking and hitting). Data on acceptance, expelling, gagging, and vomiting were summarized as the percentage of bite offers in which they occurred, with each new food presentation constituting a separate trial. Problem behav-

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ior was summarized as number of responses per minute.

The participant was seated in a high chair during all meals, and the experimenter presented a bite of food on a spoon in front of the participant's mouth every 30 s (a fixed-time [FT] 30-s schedule). Meals were initially 20 bite offers in length. During baseline, the bite of food was removed contingent on problem behavior. A bite from a different food group was presented at the beginning of the next trial. The participant received brief praise contingent on acceptance. Expelling, gagging, and vomiting were ignored.

Following baseline and before treatment, an assessment consisting of 11 meals was conducted to identify foods that Anders was more likely (high probability; acceptance $\geq 80\%$ of trials offered) and less likely (low probability; acceptance $< 80\%$ of trials offered) to accept. Each meal was identical to baseline except that a variety of additional foods (including those used in baseline) were included. All foods used throughout baseline and treatment were from this initial low-probability group.

Treatment consisted of several components. At the start of the meal, Anders received several highly preferred items (books and audiotapes) identified through a preference assessment (Fisher *et al.*, 1992). As in baseline, problem behavior resulted in the removal of the bite of food (i.e., he could escape the bite offer), and food from a different group was presented at the beginning of the next trial. In addition, books and audiotapes were removed contingent on problem behavior (i.e., response cost) or not accepting the bite during the 30-s interval. If books and audiotapes were removed, the items were returned in subsequent trials once he accepted a bite of food (i.e., DRA) without engaging in problem behavior. Anders also received brief praise contingent on

acceptance, and expelling, gagging, and vomiting were ignored.

Anders' mother and grandmother were trained to implement the intervention. First, the caregivers were given instructions on the mealtime protocol. Next, they observed several meals fed by the experimenter. Finally, the caregivers fed Anders using the multicomponent intervention and were given feedback on their performance after each meal. Data were collected on correct implementation of each component of the intervention. Both caregivers implemented the multicomponent treatment with above 80% accuracy.

A second independent observer collected data during 50% of the meals. Occurrence agreement for acceptance, expelling, and problem behavior were 100%, 100%, and 95% (range, 50% to 100%), respectively. Nonoccurrence agreement for acceptance, expelling, gagging, vomiting, and problem behavior were 100%, 100%, 100%, 100%, and 99% (range, 93% to 100%), respectively.

RESULTS AND DISCUSSION

Figure 1 shows that the multicomponent intervention led to an increase in food acceptance (top panel) and a decrease in problem behavior (bottom panel) during both treatment phases. In addition, expelling, gagging, and vomiting decreased to zero during the final treatment phase. Anders continued to maintain high levels of acceptance and low levels of problem behavior with his mother and grandmother. Meal length was increased from 20 to 60 bites, and additional low-probability food items (chicken, bananas, and peas) were introduced throughout this final treatment phase. During the course of Anders' 4-month admission, G-tube feedings of Ensure Plus® were altered (from 1,066.5 cc per day to 355.5 cc per day) in

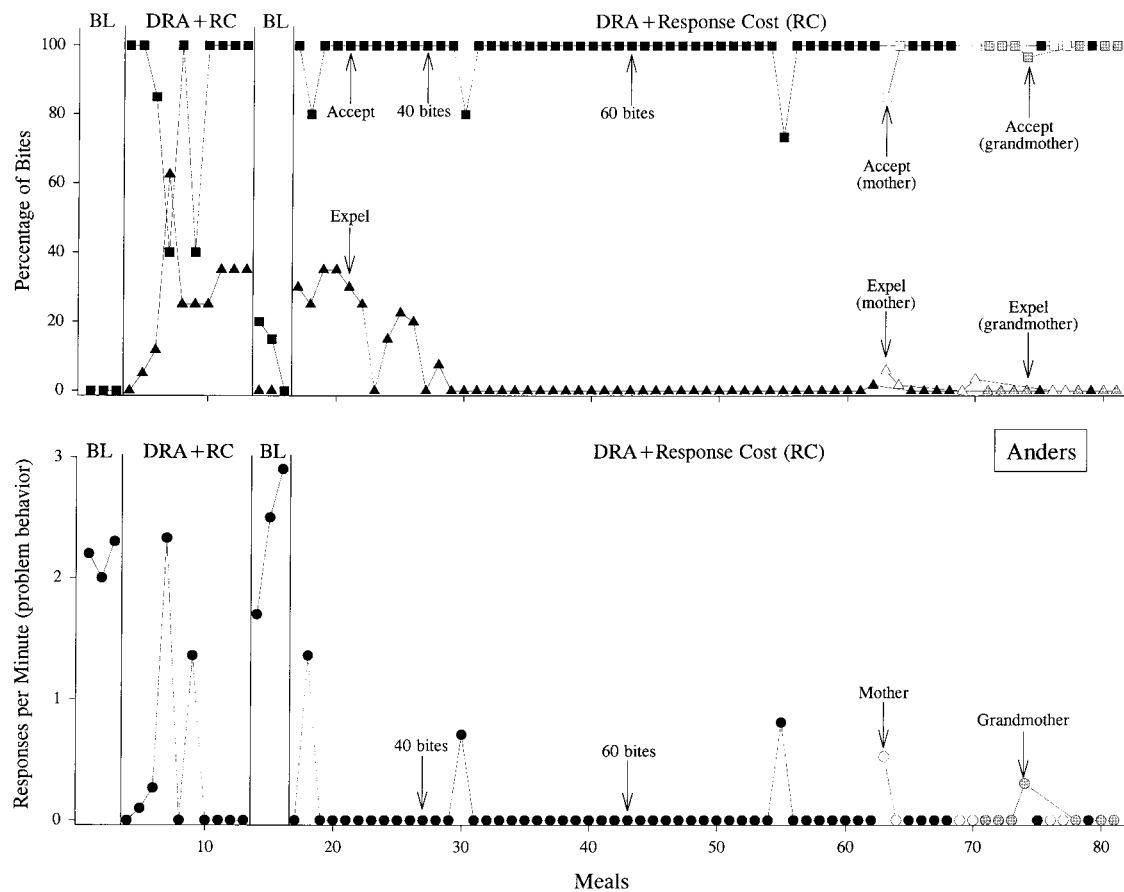


Figure 1. Percentage of bites accepted and expelled (top panel) and number of responses per minute of problem behavior (bottom panel). BL = baseline, DRA = differential reinforcement of alternative behavior, and RC = response cost.

consultation with medical staff, and his weight increased from 16.7 kg to 20.3 kg.

These results extend the findings of Kee-ney et al. (2000) by showing that an intervention consisting of positive reinforcement and response cost can effectively change food refusal, a behavior often considered to be maintained by negative reinforcement. It is conceivable that the initial noncontingent presentation of the preferred stimuli during the first treatment meals was responsible for behavioral reduction. However, the initial effects of the presentation of the preferred stimuli alone were not maintained beyond the first few sessions, suggesting that other components were necessary to maintain low levels of problem behavior.

The removal of reinforcers may have invoked two processes, punishment and negative reinforcement. Removal of reinforcers contingent on problem behavior most likely functioned as punishment (i.e., response cost), whereas the removal of reinforcers after 30 s of nonacceptance may have functioned as negative reinforcement (i.e., avoidance).

One limitation to our multicomponent treatment is the possibility that the individual may not meet the criterion for reinforcement (i.e., accepting a bite) following the removal of tangible reinforcers (books and audiotapes). This occurred in only two of the five meals in which Anders lost the tangible reinforcer during the final treatment

phase. In addition, acceptance in the meal following each of those two meals was always 100%; thus, the loss of reinforcers did not interfere with subsequent meals.

REFERENCES

- Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, 25, 491–498.
- Keeney, K. M., Fisher, W. W., Adelinis, J. D., & Wilder, D. A. (2000). The effects of response cost in the treatment of aberrant behavior maintained by negative reinforcement. *Journal of Applied Behavior Analysis*, 33, 255–258.
- Kerwin, M. E. (1999). Empirically supported treatments in pediatric psychology: Severe feeding problems. *Journal of Pediatric Psychology*, 24, 193–214.

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